REMARKS

Introduction

The Office Action of October 28, 2003 rejected claims 1-21 under 35 U.S.C § 103(a) as being unpatentable over Sugiyama et. al. (JP 11-174382A). The Office Action also objected to claim 21 as having an informality. Claims 1-21 are pending and claims 1, 6, 15, and 21 are the independent claims at issue.

Claim Objections

Claim 21 has been amended such that the objection of the Examiner is no longer present and Applicants respectfully request that the objection be withdrawn. In particular, the phrase "of 0 degrees" has been deleted from claim 21.

Claim Rejections under 35 U.S.C. § 103

Sugiyama relates to a polarization-independent type optical isolator. With respect to Sugiyama, the Examiner states that the fact that "the tapered end of the third wedge is rotated 90 with respect to the tapered edge of both the first wedge and the second wedge reasonably suggests that the third wedge does indeed have an optical axis that is different from both the optical axis of the first wedge and the optical axis of the second wedge."

However, the optical axis of a birefringent material is not the same thing as the wedge angle. Sugiyama, for example, discusses that the birefringence crystal boards 11, 12, 21, and 22 are processed into wedge inclined surface 11a, 12a, 21a, and 22a, of the each same angle." *See* ¶ 11. Sugiyama also illustrates in Figure 1 that the optical axes of the birefringence boards are represented by the designations of C1 and C2. *See* ¶ 17. The angle of the inclined surface is

therefore not the same thing as the optical axis and is in fact independent of the optical axes. As a result, the orientation of a wedge angle of a birefringent board does not reasonably suggest the orientation of the optical axis of the birefringent board. In other words, the orientation of the wedge angle provides no information about the optical axis. As a result, the mechanical orientation of a wedge cannot teach or suggest that a wedge has a particular optical axis.

More particularly, the isolator taught by Sugiyama includes a unit 1 and a unit 2 and the description indicates that unit 1 is identical to unit 2. *See* ¶ 13. The unit 1 includes the birefringence crystal boards 11 and 12 while the unit 2 includes the birefringence boards 21 and 22. *See* ¶¶ 11-13. The birefringence crystal boards 11 and 12 have optical axis C1 and C2, respectively. *See* ¶ 17. However, Sugiyami teaches in the description of the unit 2 that "[o]ptical isolator unit 2 becomes optical isolator unit 1 and same shape" *See* ¶ 13. Further, paragraph 17 appears to teach that the optical axis of the birefringence boards 11 and 21 are the same (C1 appears to be the optical axis of boards 11 and 21) and that the optical axis of the birefringence boards 12 and 22 are also identical (C2 appears to be the optical axis of boards 12 and 22).

Sugiyama also teaches that the unit 2 is rotated 90 degrees from the unit 1. *See, e.g.,* ¶ 14. However, because the optical axis of the birefringence board 11 and 21 are the same, rotating the unit 2 by 90 degrees also rotates the optical axis of the birefringent boards 21 and 22 by 90 degrees with respect to the birefringent boards 11 and 12, respectively. The configuration of Figure 1 appears to illustrate an isolator where the optical axes of the birefringence board 11 and 21 are separated by 90 degrees after the unit 2 is mechanically rotated by 90 degrees. Thus, the isolator taught by Sugiyama not only appears to have two identical units 1 and 2, but

Sugiyama also teaches that the mechanical and optical rotation are identical (90°). *See* ¶¶ 13, 16-17.

In contrast, the isolators claimed in claims 1-21 have first and second stages that are not identical. Claim 1 requires, in the second stage, that "the second stage is mechanically rotated with respect to the first stage by a first angular displacement and the second stage is optically rotated with respect to the first stage by a second angular displacement that is different from the first angular displacement." Sugiyama, in contrast, teaches an optical rotation that is identical to the mechanical rotation. As a result, claim 1 is not taught or suggested by Sugiyama.

Claim 6 similarly requires "a second stage mechanically rotated 90° with respect to said first stage" while also requiring, in the second stage, a "third wedge with a third optical axis that is rotated 45 with respect to the optical axis of the first wedge" and a "fourth optical axis that is rotated 45 with respect to the optical axis of the second wedge". Claims 15 and 21 have been amended to include a similar requirement. In the claims 6-21, the optical axes of the first wedge and the third wedge are not separated by 90 degrees, as taught by Sugiyama, even though the second stage is mechanically rotated by 90 degrees.

Further, the optical axis of a birefringent board affects the way that light travels through the birefringent board. The optical axis corresponds to the direction in the birefringent board where there is no double refraction. For example, the specification states in one example that, "with wedge 304 now having an optical axis angle of 0° with respect to the path 202 and applied first and second rays 318 and 320, the two rays will travel in substantially straight paths through the second stage 302, emerging from wedge 308 with orthogonal polarizations and separated by a walk-off distance d'.". *See* p.8 lls. 8-11. The selection of an optical axis therefore has an impact on the way a light ray is refracted within a birefringent board.

Claim 6 requires that the second stage "refract said first and second rays in a substantially parallel manner" and claim 15 similarly requires "refracting said first and second rays in a substantially parallel manner". Sugiyama does not appear to address this requirement. In fact, Sugiyama appears to teach away from this requirement because the optical axis of the refringent board 21 is the same as the optical axis of the refringent board 11, but rotated by 90 degrees in Figure 1 of Sugiyama. The optical axes associated with the unit 2 suggest that the light rays will not travel in a substantially parallel manner through the unit 2. Sugiyama therefore teaches away from claim 6 and claim 15.

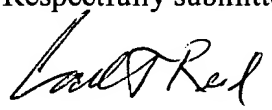
In view of the above discussion, Applicants respectfully traverse the rejection of claims 1-21 under 35 U.S.C. § 103(a). In addition, the Examiner has not presented a prima facie case of obviousness. The Examiner acknowledges that the cited reference does not teach the invention as claimed and has not indicated that the cited reference suggests the invention as claimed. In particular, there is no suggestion that that the units of Sugiyama should have an optical rotation that is different from the mechanical rotation. In fact, one apparent advantage is the ability to use identical units to manufacture an optical isolator. Also, the optical axis can have an impact on the refraction of the light rays. Sugiyama does not appear to address this issue and is concerned with minimizing polarization dispersion. Thus, a prima facie case of obviousness has not been made by the Examiner.

For at least the reasons discussed above, the independent claims 1, 6, 15, and 21 overcome the cited art and are in condition for allowance. The dependent claims 2-5, 7-14, and 16-20 depend from at least one of the independent claims and overcome the cited art for at least this reason and are also in condition for allowance.

Claims 1-21 are thus pending and favorable action is requested. In the event of any question, the Examiner is respectfully requested to initiate a telephone conversation with the undersigned.

Dated this 28th day of January 2004.

Respectfully submitted,



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